Claims:

1. A spectrum coding apparatus comprising:

an acquisition section that acquires a spectrum whose frequency band is at least divided into a low-frequency band and high-frequency band;

an estimation section that estimates the shape of the spectrum of said high-frequency band using a filter having the spectrum of said low-frequency band as an internal state;

a first coding section that codes a coefficient indicating the characteristic of said filter; and

a second coding section that codes an outline of the spectrum determined based on said coefficient.

2. The spectrum coding apparatus according to claim 1, further comprising a division section that divides the spectrum of said high-frequency band into a plurality of subbands, wherein said first coding section codes said coefficient for each of said subbands.

3. A spectrum decoding apparatus comprising:

a first decoding section that decodes a coefficient indicating a filter characteristic from coding information;

an acquisition section that acquires a spectrum in a low-frequency band out of a spectrum whose frequency band is at least divided into a high-frequency band and

low-frequency band;

a generation section that generates an estimated spectrum of the spectrum of said high-frequency band using a filter having the spectrum of said low-frequency band as an internal state; and

a second decoding section that decodes an outline of a spectrum determined based on said decoded coefficient.

4. The spectrum decoding apparatus according to claim 3, wherein said first decoding section decodes said coefficient for each of said plurality of subbands of the spectrum of said high-frequency band.

5. A spectrum coding method comprising the steps of:

performing a frequency transformation of a signal whose frequency k is in a band of $0 \leqq k < FL$ and calculating a first spectrum;

performing a frequency transformation of a signal whose frequency k is in a band of $0 \leqq k < FH$ and calculating a second spectrum;

estimating the shape of said second spectrum in a band of $FL \leqq k < FH$ using a filter having said first spectrum as an internal state;

coding a coefficient indicating said filter characteristic; and

coding an outline of the second spectrum determined

based on a coefficient indicating said filter characteristic together.

6. The spectrum coding method according to claim 5, wherein said second spectrum is divided into a plurality of subbands and the coefficient indicating the characteristic of said filter is coded for each of said subbands.

7. The spectrum coding method according to claim 5, wherein the filter is expressed by the following expression

$$P(z)=\frac{1}{1-\sum_{i=-M}^{M}\beta_i z^{-T+i}}$$

where M is an arbitrary integer, T is a pitch coefficient and β_i is a filter coefficient and estimation is performed using a zero-input response of said filter.

8. The spectrum coding method according to claim 7, wherein M=0, β_0=1 are assumed in said filter.

9. The spectrum coding method according to claim 5, wherein an outline of the spectrum is determined for each subband determined by pitch coefficient T.

10. The spectrum coding method according to claim 5, wherein said first signal is a signal coded and then decoded

in a lower layer or a signal obtained by upsampling said signal and said second signal is an input signal.

11. A spectrum decoding method comprising the steps of:

decoding a coefficient indicating a filter characteristic; performing the frequency transformation of a first signal to obtain a first spectrum and generating an estimated value of a second spectrum whose frequency k is in a band of $FL \leqq k < FH$ using a filter having the first spectrum in a band of $0 \leqq k < FL$ as an internal state; and

decoding a spectral outline of the second spectrum determined based on a coefficient indicating said filter characteristic together.

12. The spectrum decoding method according to claim 11, further comprising a step of dividing said second spectrum into a plurality of subbands and decoding a coefficient indicating said filter characteristic for each of said subbands.

13. The spectrum decoding method according to claim 11, wherein the filter is expressed by the following expression

$$P(z) = \frac{1}{1 - \sum_{i=-M}^{M} \beta_i z^{-T+i}}$$

where M is an arbitrary integer, T is a pitch coefficient and βi is a filter coefficient and an estimated value

is generated using a zero-input response of said filter.

14. The spectrum decoding method according to claim 13, wherein $M=0$, $\beta_0=1$ are assumed in said filter.

15. The spectrum decoding method according to claim 11, wherein the outline of the spectrum is decoded for each subband determined by pitch coefficient T.

16. The spectrum decoding method according to claim 11, wherein said first signal is generated from a signal decoded in a lower layer or a signal obtained by upsampling said signal.

17. An acoustic signal transmission apparatus comprising:

an acoustic input section that converts an acoustic signal to an electric signal;

an A/D conversion section that converts a signal output from said acoustic input section to a digital signal;

a coding apparatus that performs coding on the digital signal output from said A/D conversion section using the spectrum coding method according to claim 5;

an RF modulation section that modulates the code output from said coding apparatus into a signal of a radio frequency; and

a transmission antenna that converts the signal output from said RF modulation section to a radio wave and transmits the radio wave.

18. An acoustic signal reception apparatus comprising:

a reception antenna that receives a radio wave;

an RF demodulation section that demodulates the signal received from said reception antenna;

a decoding apparatus that performs decoding from information obtained by said RF demodulation section using the spectrum decoding method according to claim 11;

a D/A conversion section that converts the signal output from said decoding apparatus to an analog signal; and

an acoustic output section that converts an electric signal output from said D/A conversion section to an acoustic signal.

19. A communication terminal apparatus comprising the acoustic signal transmission apparatus according to claim 17.

20. A communication terminal apparatus comprising the acoustic signal reception apparatus according to claim 18.

21. A base station apparatus comprising the acoustic signal transmission apparatuses according to claim 17.

22. A base station apparatus comprising the acoustic signal reception apparatuses according to claim 18.